Jan 5th No 3 P.

27 Sanson

An
Inaugural Essay Page March 2 1829

On
Hæmoptysis

For
The degree of Doctor of Medicine

In the
University of Pennsylvania

By
Joseph E Cox

of Virginia

January 5th 1829

Before entering on the subject under consideration, it is necessary to make a few remarks on the pulmonary apparatus and its lining membrane.

This apparatus performs three grand functions, the first, is the aeration of the blood, the second, is pulmonary exhalation, the third, is the production of sound, which, in man, being variously modified by intellect, forms speech, singing, et cetera.

From the complex functions of this apparatus, we must naturally suppose, that it is more liable to disease than most organs, especially those that perform but one function; of which we have a good exemplification in machinery, the more complicated, the greater is the liability to be deranged.

The pulmonary apparatus, comprising the

larynx, bronchia, and its ramifications, is lined internally, by a delicate membrane classed by Bichat under the head of mucous membranes.
This membrane is highly organized, being composed of blood vessels, nerves, lymphatics &c. It possesses great sensibility and vital powers, which will enable us to distinguish it from other organs.
Broussais, who has enriched the profession with an elaborate treatise of physiology, applied to pathology, thinks that the mucous membranes should be considered an organ of sense.
The sympathies of this surface, are numerous; they may be remote, contiguous, or continuous.
The functions of this surface, being one of the emunctories of the animal economy — and performing the office of absorption.

Sh
sig
arr
are
wit
wet
is
is
dec
pla
hav
pr
to
Sta
com
bet
Whe
out
sou
ly

Hæmoptysis is derived from two greek words which signify to spit blood. A genus of disease arranged by Cullen in the class pyrexia and order hemorhagia. It has been divided into active and passive; the former, is attended with a development of vital forces; the latter is characterized by a deficiency of action, and is usually produced by some organic disease, designated by the term debility; on which, physicians have founded a practice that has proved fatal to thousands. But, the present physiological investigations bid fair to remove this evil from practice.
Hæmoptysis is a spitting of blood, which may come from the fauces, bronchia, or lungs; but most frequently from the latter.
When, from the fauces, it is by hawking, without pain, cough, oppression, or febrile excitement, sometimes, we are able to distinguish its source by a close examination.

When from the trachea, it is often the precursor of phthisis. It is not very easy to distinguish whether the hemorhages is from the trachea or lungs; the blood from the trachea is of a darker colour, and not so frothy, besides, the constitutional symptoms are less urgent.
The discharges from the lungs is of a light florid or vermilion colour, frothy, and brought up with more or less coughing.
The symptoms which precede a flow of blood, are a sense of fulness, weight, tightness or oppression about the chest, which is increased by a full inspiration, some uneasiness in breathing; sometimes we have the phenomena of fever developed, such as shiverings, pain in the back, head, and loins, flushed face, lassitude, costiveness, dry skin, coldness of the extremities, and a quick hard pulse.

The
pa
at
pe
the
sta
rec
The
dou
at
to
It
w,
slig
brin
Pro
ma
the
is n
but

These are liable to variations; sometimes the pulse is small and scarcely perceptible. A short time before the hemorrhagy takes place, there is more or less irritation about the fauces and larynx, with a peculiar saltish taste in the mouth. It frequently occurs without any premonitory symptoms. The quantity of blood varies very much; sometimes the expectoration is merely tinged, at others, the discharge is so profuse as to threaten the life of the patient. It commonly occurs for several days together, intermitting and being excited by slight causes; even talking will often bring it on.

Professor Chapman remarks, that a great majority of cases occurs at night, when the patient is in bed. This observation is not confined to this species of hemorrhagy, but is equally applicable to epistaxis.

A
of
the
Ro
da
ca
in
ar
re
the
of
a
s
fr
in
B
O
u
u
mo
sp

He thinks it may be owing to an increase of sensibility, or the horizontal position with the legs drawn up.

Reasoning from analogy, there can be no doubt the horizontal position alone, is the cause of its occurence in the night, for in an inflamed limb, or when we wish to arrest hemorrhage, we must elevate it to retard the flow of arterial, and to facilitate the return of venous blood,. From the colour of the blood in hæmoptysis, it is generally admitted to be arterial.

The connection between hemorrhage — from the lining membrane of the lungs, and inflammation of it, is almost inseparable. By attentively observing the phenomena — which precede a flow of blood, and those which accompany inflammation; we cannot distinguish, until there is a discharge of blood.

The
of
the
ne
ve
by
Ve
pe
fer
the
ser
wi
To
wa
co
fre
en
Ca
fro
me
ma

There is, in hæmoptysis a considerable degree of irritation if not inflammation; and if the discharge of blood did not take place, we should have in a majority of cases, very active inflammation, if not arrested by appropriate measures.
Very often, if not always, we have the phenomena of fever; which, according to the present doctrine in the physiological schools, must be preceded by, or accompanied with local irritation or inflammation.
To illustrate this point more fully, we will allude to dysentery, which is generally conceded to be of an inflammatory nature: frequently, if not always the stools consist entirely of blood, or mucus partially elaborated.
Causes: They may be divided into predisposing and exciting, which, will in some measure guide us in our treatment; and enable us to form some idea about the

probable termination of the disease.
The predisposing causes may be viewed under four heads. The first, is plethora: but this is not so often the cause as was supposed by the old writers.
The second predisposing cause, is the scrofulous diathesis, or that habit which is marked among other peculiarities, by a remarkable delicacy of structure, light and thin hair, soft smooth skin, a lax fibre and great mobility of frame; to these may be added the sanguine temperament.
The third predisposing cause, is characterized by a particular conformation; as prominent shoulders, narrow chest, long neck, and a slender form,
The malconformation of the chest acts very obviously, by preventing, or not allowing sufficient space, for the free expansion of the lungs. Persons, who have suffered in early life from rickets to such an extent as to

aff
the
Th
the
ma
aft
oft
It
Pa
exp
to
co
bec
mer
that
It
mb
pre
bec
whe

affect the ribs or spine, are very liable, after the age of puberty, to haemptysis.
The fourth cause, giving a predisposition, is the period of life. It rarely occurs in children under 12 years of age, and is not frequent — after the age of 35; of the two, it occurs oftener after the latter, than before the former. It chiefly prevails between the ages of 15 and 25. Pathologists have attempted in several ways, to explain this circumstance; it is said by some, to depend upon the growth of the thorax continuing after other parts of the body have been fully evolved; which is manifested by the increased width which the chest acquires at that time.
It is more reasonable to suppose, that this enlargement of the chest, has a tendency to prevent, rather than predispose to hemorrhage, being the reverse of the narrow chest, — which has been alluded to.

Ca
lea
aco
mu
ac
tac
the
mo
rec
To
Th
co
La
dis
Ca
du
ca
as
al
exc

Doctor Cullen has imputed it in part, at least, to a want of due balance between the aortic and pulmonary systems, which is felt most at this time; when the former has arrived at its utmost extension and resistance. Of these positions, the latter is far the more plausible; though, it is thought not to be a correct explanation of this remarkable circumstance.

To whatever cause it may be ascribed, there can be no doubt as to the general correctness of the position, that this particular period of life, gives a remarkable predisposition to hemorrhagy from the lungs.

Exciting causes. They may be divided into direct, and indirect; the direct exciting causes are violent exertions of the body, as running, jumping, or wrestling; sudden alarm has frequently produced it; uncommon exercise of the lungs, as loud and long

speaking, of which we have a striking exemplification in clergymen; those who play much on wind instruments, persons who are engaged in blowing-glass, are very liable being under the influence of two powerful causes, violent exertion of the lungs and extreme heat at the same time; heat alone is a very active agent in producing hemorrhage generally. The pressure of the atmosphere has a considerable influence in producing this hemorrhage, for a striking instance of which we will allude to persons passing from a dense, to a rare atmosphere, as in ascending lofty mountains.
Doctor Mead relates several remarkable cases of hæmptysis occuring in Edinburgh about the eclipse of the sun; from the barometer, it was found, that the atmosphere was lighter at that time, than

It
in
Th
Sp
co
of
Ele
of
ca
18
of
Th
Sa
wo
is
be
-m
to
of
m

it had ever before been known to be in that city.

This hemorrhage occurs most frequently in spring or the commencement of summer, which circumstance must be owing to the increase of temperature, and rarefaction of the atmosphere. Elongation of the uvula, is sometimes a cause of hæmoptysis, of which a very illustrative case came under my observation in august 1827; which was relieved by removing a portion of the uvula.

The indirect exciting causes are various; such as full living, and the free use of wine and other stimulants; when the stomach is overloaded it interupts the circulation of blood in some degree. Alternations of atmospheric temperature, the sudden exposure to cold after being overheated; the suppression of some accustomed evacuation, as the menses is a very fertile source of it;

bes
up
ne
th
(1
it
ou
ab
be
is
dar
with
the
in
mo
sho
th
is
co
sp
an

likewise hemorrhoids and epistaxis, drying up of old issues or drains, excessive venereal desires ungratified, and sometimes, the amputation of a limb.

Diagnosis; the only disease with which it is apt to be confounded, is hæmatemesis or vomiting of blood; but by a careful attention to the symptoms it may generally be distinguished. In hæmatemesis the blood is usually brought up by vomiting of a dark grumous appearance, frequently mixed with the contents of the stomach, is generally in larger quantities, and the system is more affected; the pulse is feeble, and sometimes, there is prostration. In hemoptysis the blood is brought up by coughing, it is of a light frothy appearance, vermilion colour, and mixed with mucous.

Prognosis; as far as it is idiopathic and the mere effusion of blood is concerned,

it is not dangerous. Professor Chapman says that in the whole of his practice, which we know to be extensive, he lost only one patient. Heberden had the management of fifty cases, and of which number only one case proved fatal.
In a large majority of cases, however hemorhagy from the lungs is but a symptomatic affection of phthisis pulmonalis. Post mortem appearances, according to the observations of Laenec, who is eminent in this department of medicine, the lungs of those he inspected contained patches of a reddish brown colour, firm granular when incised, exactly circumscribed, and surrounded by parts perfectly crepitous. The indurated portions do not resemble pneumonic indurations; but seem to be blood strongly coagulated and dried with the pulmonary tissue.

The portions, thus indurated, yielded when cut no humidity, unless pressed or scraped; while the other portions of the lungs were more than ordinarily imbued with a yellow, frothy serum, which escaped when incisions were made into them.
The mucous membrane of the lungs, was of a deep red colour.
As regards the pathology of hæmoptysis, when from violence, there is a rupture of the vessels, and the hemorrhage will be according to the extent of the lesion; this is of rare occurrence.
When occurring spontaneously it is an exhalation; the mucous membrane is abundantly supplied with exhalants which, in a physiological state, pour out mucous, but in a morbid condition the blood is exhaled unchanged.
In conformity to the division of hæmoptysis,

pr
te
of
my
Ta
e
m
co
the
Sy
ac
or
Tr
in
ca
Se
ts
Th
the
ap

passive hemorrhagy next requires our attention; but the most that can be said of it has been anticipated in the history of active hemorrhagy.
The flow usually occurs without much coughing, and is often accompanied ~~with~~ with extensive disease of the lungs; the countenance is pale and emaciated, although there appears to be debility of the system generally, there is an excess of action in the lungs. This species of hemorrhage is nearly, if not always, an exhalation.
Treatment of active hemorrhage, is divided into two kinds. First, that which is necessary for the suppression of the hemorrhage. Second, that which is necessary to prevent its recurrence, after it has been arrested. The latter has been too much neglected; the anxiety of the patient, is too often appeased with the mere suppression of

the hemorrhage, and will soon return to his former habits, and bring on another paroxysm. We as physicians, should always make known to our patients the importance of a prophylactic treatment, and state to him the result which would arise from a noncompliance.

Treatment. To check the flow of blood, when the phenomena of fever are developed, as great precordial uneasiness, difficult respiration with an active pulse, the chief indication is the reduction of arterial action; the best means for accomplishing it is venesection. This plan of treatment has been questioned by high authorities, but their error is so palpable that it needs scarcely be noticed.

In extensive wounds of the lungs with profuse hemorrhage, Surgeons immediately resort to bloodletting with the most-

decided benefit. The modus operandi of blood letting, is obvious; first as a revulsive; secondly, by removing a portion of the circulating mass, a part of which must come from the lungs and their appendages. To produce these effects the quantity to be taken, must be regulated by the state of the patient; we should always bleed from a large orifice in preference to a small one, for we can produce a decided impression without the patient suffering so much from debility, which is always a point of the first importance.
It is very common for writers to specify the quantity of blood to be taken, than which there is not a greater absurdity in medicine: if all of our patients were of the same constitution, temperament, habits, age &c. we might with propriety, order ten or fifteen ounces of blood to be taken;

but we cannot find any two patients whose constitutions, habits, temperaments &c. are exactly alike. It is this discrimination which raises our profession, in a measure, from the fetters of empiricism, to one of a more exalted station; that of a science.
The extent to which bloodletting may be urged. I can only say that more danger results from the timid use of the lancet, than from its being carried too far. There is a very interesting case recorded in the second volume of Professor Coxe's Medical Museum a communication from a clergyman to the late Professor Rush, stating his own case and the extent of bloodletting being thirty two times in ten days, with the loss of two gallons of blood, after which, he recovered his health entirely, and did not suffer from another attack.

Su
re
me
fo
th
me
cu
th
fo
B
re
be
co
the
Co
the
is
me
ate
Co

Small and repeated bleedings have been recommended, but the practice is not only inert, but highly pernicious; producing debility, without controling the flow of blood. Topical bloodletting may be requisite after general, either cups or leeches may be used, of these the former is the best, being a more powerfull revulsive.

Blisters may be necessary after the reduction of arterial action, and are best suited to those cases attended with cough, and stricture, or tightness about the chest.

Common Salt was highly spoken of by the late Professor Rush; its modus operandi is not very intelligible; it appears to be much better suited as an enema in cases attended with constipated bowels.

Cool drinks and cool air stand next

next in importance to bloodletting; the drinks may consist of ice water, lemonade, vinegar and water &c. Little will our treatment avail, if the patient is not kept in a cool and well ventilated room; company should be excluded, every thing that has a tendency to excite the arterial system must be removed; he should be placed in bed with his shoulders elevated, and his extremities extended; the importance of the latter, was first noticed by Professor Physick.

Cold applications to the surface, as wrapping the patient in wet blankets, have been recommended; it is a very dangerous practice, and should be avoided, it diminishes capillary action and forces the blood to internal organs; nothing has a greater tendency to induce appoplexy or inflammation of the lungs

Dr
su
in
ag
ap
pr
ha
bu
if
co
by
ca
so
wr
ope
ac
Dr
exp
ab
Em

Digitalis has been proposed as a substitute for the lancet, but it will in no manner suffice for that important agent; the case to which it is most applicable; is a small quick pulse, and great mobility, accompanied with a hard dry cough; under these circumstances, little benefit will result from its use, if the stomach is not in a physiological condition; a point too much neglected by those who have bestowed such high encomiums on this article.

Sometimes hemoptysis may be owing to nervous irritation; then the judicious exhibition of opium or some of its preparations, or prussic acid; the latter is recommended by Doctor Hosack of Newyork; it is a powerfull sedative, and well suited to cases attended with dry and convulsive cough.

Emetics have been used by Professor Chapman

with the most decided benefit; they are active means, and require discrimination in their use; they appear to be inadmissable when bloodletting is strongly indicated, or when the stomach is in a pathological state. By not attending to this, they may produce effects which are tenfold more formidable than the disease for which they are administered. In chronic cases, when the stomach is in a perfectly normal state, they may be given to produce a revulsion.

Refrigerants have been long used in all cases of inordinate arterial action. Of this class, the nitrate of potash, is most certain in its action; it appears to act as a sedative, and is admissable, when the phenomena of fever are developed such as thirst, a hot dry skin &c.

When it is brought on by a suppression

of some evacuation, our remedies must be directed to it: for little will be attained untill that is relieved.
Treatment of passive hemorhage, or that which occurs when the system is in a state of atony. Bee general bleeding and evacuants are inadmissable. The indication is to give tone to the system, at the time we are endeavoring to arrest the flow of blood. The best means for doing which, are the judicious use of astringents and tonics. The sulphate of Quinine, and elixir vitriol, are entitled to the greatest share of our confidence. The preparations of iron may be used sometimes with the most decided benefit.
Topical bloodletting is necessary to relieve cough, oppression, and dyspnea; if the symptoms do not yield to it, a large blister should be applied over the chest.

It is recommended to apply blisters to the extremities; but a great object is to locate the disease in some organ or tissue, and apply our remedies as near as practicable to the diseased organ or tissue; blisters on the extremities, in cases of debility, sometimes, produce gangrene, two striking examples of which came under my observation in the Philadelphia alms house infirmary one in july, the other in august 1828.
There should be conjoined with these medicines, an invigorating diet, moderate exercise, and the liberal use of malt liquors. Treatment to prevent a recurrence, after it has ceased arrested. Every thing which has a tendency to excite arterial action, should be avoided, — particularly excesses, as violent mental, and corporeal exertions, wine and —

alcoholic liquors. The bowels should be kept open by mild purgatives; of these the saline should be preferred; if torpid, the mercurial purgatives, as calomel, and the blue pill, should be given, if not contraindicated.
The occasional use of nitrate of potash, conjoined with moderate exercise on horseback or sailing, has been productive of the most decided benefit.
The diet should be of the mildest kind, such as the farinaceous articles.
The drinks should be cool and acidulated; the mineral waters are very good, particularly those impregnated with carbonic acid gas.
In concluding this essay, it is seen, that, I have omitted the medicines called astringents; and not without due reflection; for it is not at all intelligible how such medicines can, act on the

lungs, when applied to the mucous surface of the stomach. These medicines were first employed from analogy of action on other parts to which they were applied, and routine of practice has kept them popular resources until the present time. But in this enlightened epoch of medicine we should not permit custom to overcome sound reasoning without which our profession would be a fabric formed of the weakest materials. Of this class of medicines, the Sugar of lead has held the highest rank, and not without some merit. It's modus operandi appears to be obvious. In small doses a sedative effect is produced:- in large, it either vomits or purges — and thus proves beneficial as a revulsive. Admitting these remedies could act as astringents, would it not be hazardous to use them in active hemorhagy verging to inflamation? we might induce pulmonary apoplexy or pneumonia.